

Destructive tests on welds in metallic materials — Bend tests

The European Standard EN 910 : 1996 has the status of a
British Standard

ICS 25.160.40

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee WEE/2, Welding tests, upon which the following bodies were represented:

- Aluminium Federation
- Association of Consulting Scientists
- British Constructional Steelwork Association Ltd.
- British Iron and Steel Producers' Association
- Electricity Association
- Health and Safety Executive
- Institution of Structural Engineers
- Lloyd's Register of Shipping
- Ministry of Defence
- Power Generation Contractors' Association (PGCA (BEAMA Ltd.))
- Welding Institute
- Welding Manufacturers' Association (BEAMA Ltd.)

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National foreword

This British Standard has been prepared by Technical Committee WEE/2 and is the English language version of EN 910 : 1996 *Destructive tests on welds in metallic materials — Bend tests* published by the European Committee for standardization (CEN).

EN 910 was produced as a result of international discussions in which the United Kingdom took an active part.

BS EN 910 : 1996 supersedes tests detailed in BS 709 : 1983, BS 4206 : 1967 and BS 3451 : 1973 which have been deleted by amendment.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

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English version

Destructive tests on welds in metallic materials — Bend tests

Essais destructifs des soudures sur matériaux
métalliques — Essais de pliage

Zerstörende Prüfungen von Schweißnähten an
metallischen Werkstoffen — Biegeprüfungen

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European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 121, Welding, of which the secretariat is held by DS.

This European Standard shall be given the status of a national standard, either by publication of an identical test or by endorsement, at the latest by September 1996, and conflicting national standards shall be withdrawn at the latest by September 1996.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This standard specifies a method for making transverse root, face and side bend tests on test specimens taken from butt welds, butt welds with cladding (subdivided into welds in clad plates and clad welds) and cladding without butt welds in order to assess ductility and/or absence of imperfections on or near to the surface of the joint. It also gives the dimensions of the test specimen.

In addition this standard specifies a method for making longitudinal root and face bend tests to be used instead of transverse bend tests for heterogeneous assemblies when base materials and/or filler metal have a significant difference in their physical and mechanical properties in relation to bending.

This standard applies to metallic materials in all forms of product with welded joints made by any fusion arc welding process. Side bend tests may be carried out when the wall thickness is greater than 12 mm.

2 Definitions

For the purpose of this European Standard, the following definitions apply:

2.1 face bend test specimen of butt weld (FBB)

A specimen for which the surface in tension is the side which contains the larger width of the weld or the side from which the welding arc was first applied.

This applies to both transverse (see figure 1a) or longitudinal (see figure 1c) butt welds specimens.

2.2 root bend test specimen of butt weld (RBB)

A specimen for which the surface in tension is the side opposite to the face butt weld bend test specimen.

This also applies to both transverse (see figure 1a) or longitudinal (see figure 1c) butt welds specimens.

2.3 transverse side bend test specimen of butt weld (SBB)

A specimen for which the surface in tension is a cross-section of the weld (see figure 1b).

2.4 face bend test specimen of cladding without a butt weld (FBC)

A specimen for which the cladding is in tension (see figure 1d).

This applies to both transverse or longitudinal specimens.

2.5 side bend test specimen of cladding without a butt weld (SBC)

A specimen for which the cross-section of the cladding overlay is in tension (see figure 1e).

This applies to both transverse or longitudinal specimens.

2.6 face or side bend test specimen of cladding with a butt weld (FBCB or SBCB)

A specimen for which the cladding is in tension or for which the cross-section of the cladding overlay is in tension and which contains a butt weld (see figure 1f and figure 1g).

3 Principle

Submitting a test specimen, taken transversely or longitudinally from a welded joint, to plastic deformation by bending it, without reversing the bending direction, in such a way that one of the surfaces or cross-sections of the welded joint is in tension.

Unless otherwise specified, the test shall be carried out at ambient temperature (23 ± 5) °C.

The test shall be made according to one of the methods described in clause 6.

4 Denominations and symbols

The denominations and symbols to be used for the bending tests are specified in table 1 and represented in figures 1 to 3.

5 Removal of test specimens

5.1 Removal

For transverse bend test of butt welds the test specimen shall be removed transversely from the welded joint of the manufactured product or from the welded test piece in such a way that after machining the weld axis will remain in the centre of the test specimen or at a suitable position for testing.

For longitudinal bend test of butt welds the test specimen shall be removed longitudinally from the welded joint of the manufactured product or from the welded test piece.

The location and orientation of bend test specimen of cladding shall be specified by the application standard or by agreement between the contracting parties.

5.2 Marking

Each test piece shall be marked to identify its exact location in the manufactured product or in the joint from which it has been removed.

If required by the relevant application standard the direction of working (e.g. rolling or extrusion) shall be marked.

Each test specimen shall be marked to identify its exact location in the test piece from which it has been removed.

When removed from the test piece, each test specimen shall be marked.

5.3 Heat treatment and/or ageing

No heat treatment shall be applied to the welded joint or to the test specimen unless it is specified or allowed by the relevant application standard dealing with the welded joint to be tested. Details of any heat treatment shall be recorded in the test report. If natural ageing of aluminium alloys takes place, the time between welding and testing shall be recorded.

Table 1. Denominations and symbols		
Symbol	Denomination	Unit
a	Thickness of the test specimen	mm
b	Width of the test specimen	mm
b_1	Width of outside fusion line	mm
c	Thickness of the cladding	mm
D	Outside diameter of the pipe ¹⁾	mm
d	Diameter of the former	mm
l	Distance between the rollers	mm
L_f	Initial distance between contact of the roller and the centre line of the weld	mm
L_o	Original gauge length	mm
L_s	Maximum width of the weld after machining	mm
L_t	Total length of the test specimen	mm
R	Radius of the rollers	mm
r	Radius of the test specimen edges	mm
t	Thickness of the welded joint or base material under cladding	mm
α	Bending angle	° (degrees)
FBB	Face bend test specimen of butt weld	not applicable
RBB	Root bend test specimen of butt weld	not applicable
SBB	Transverse side bend test specimen of butt weld	not applicable
FBC	Face bend test specimen of cladding without a butt weld	not applicable
SBC	Side bend test specimen of cladding without a butt weld	not applicable
FBCB	Face bend test specimen of cladding with a butt weld	not applicable
SBCB	Side bend test specimen of cladding with a butt weld	not applicable
¹⁾ The term 'pipe', alone or in combination, is used to mean 'pipe', 'tube' or 'hollow section (without rectangular cross-section)'.		